# Utah BLM

# GIS

# Implementation

# Plan

**(DRAFT - For Internal Review)**
**May 9, 2000**

**Bureau of Land Management**
**State of Utah**

**Geographic Information Systems (GIS)**
**Implementation Plan**
**May 9, 2000**

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**Utah GIS Implementation Plan (Draft - For Internal Review)**

**Section 1        Project Background and Description**

1.2        Introduction and Background

This document is developed and maintained by Walt Phelps in conjunction with Utah's GIS community.  The document is to be considered a "living document" and will be updated on an ongoing basis until final implementation of the preferred design is complete, at which time an Operations and Maintenance document will be developed.

A statewide, long term GIS preferred system design and operation's plan was approved by the GIS/Mapping Reengineering Team and statewide Dealmakers on July 15, 1999.  Funding for implementation of the preferred design was given approval by the ULT in a meeting held in Salt Lake City on August 31, 1999.

1.2        Purpose

The document will serve as the project plan and management tool for implementing the GIS preferred design for the State of Utah.  It will provide a structure that is broad enough to address all project related initiatives, yet will contain sufficient detail to track progress against the activities in the plan.

1.3        Project Goals and Objectives

The system design will provide for a coherent framework for all GIS related activities within the State.  The design will ensure that:
        -Data is accessible in a similar manner for all users.
        -Data is maintained through a standard set of operating procedures.
        -Data is captured once and shared by all.
        -All updates are visible to all users within 24 hours.
        -All users have easy access to metadata for all corporate and collaborative/project data.

1.4        Performance Measures

System success will be defined with the completion of the following objectives:
        -An organized and stable directory structure is in place.
        -Data is segregated and maintained into corporate, project/collaborative, and user data, each type having its own data management procedures.
        -Directories and files are maintained using standard naming conventions.

-Procedures for establishing standards, and capturing and documenting data are in place.

-Roles and responsibilities are clearly defined.

## 1.5 Scope

The document outlines activities, resource assignments, and schedules for all aspects of GIS Reengineering implementation. The key components of the document, identify hardware/software deployment and data management. It also identifies resources that will be assigned to key tasks and sets forth an overall implementation schedule.

## 1.6 General Roles and Responsibilities of Offices

State Office

-Will provide the lead for overall implementation planning, coordination, and communication with Field Offices.

-Certify the GIS design through testing and implement central process and software to replicate and distribute data.

-IRM will assure system configuration and system administration.

-GIS staff and IRM will manage this central statewide system.

-Purchase, install, and configure equipment and services for the implementation.

-Address budget issues related to implementation.

Field Office

-Administer and operate local systems.

-Provide updated data using established standards and procedures.

-Maintain backups for local data.

-Assure compliance to statewide data quality standards and equipment configurations.

## Section 2    Implementation Strategy

Overview

This plan describes the implementation strategy for the preferred GIS design. This design provides GIS geographic data resources to each field office. It includes applications running on the client desktop, with network access to distributed data sources at each location. A central GIS data server located in the Utah BLM State Office (USO) maintains a composite copy of the GIS data libraries. Corporate data is replicated from the central data server to Field Office GIS data servers to support data currency requirements. Data updates are sent to the USO from the field where they are quality checked. Following approval, the data is added to the corporate data through the library update process.

The following sections describe the specifics regarding hardware and software requirements, configurations, task descriptions, and staff responsibilities to accomplish this workload.

## 2.1 Hardware/Software Baseline

### 2.1.1 Hardware

Field Office Servers including GSENM (12)

Each field office is scheduled to receive a new Gateway 8200 print and file server through the "Server Refresh" that is ongoing throughout the Bureau. The existing Compaq 2500 servers located in most field offices will be converted to GIS corporate data servers. They will house the corporate GIS data. There is an option for the servers to serve applications and will be tested further. This option could also be implemented on an office-by-office basis. Each office has received their Gateway 8200 and IRM anticipates both servers to be in production by May 26, 2000 statewide.

Salt Lake Field Office/State Office

Salt Lake Field Office will receive a Compaq 2500 server that is currently in production in the USO. The State Office will receive a new Compaq 800 server. These servers will be used specifically to serve GIS corporate data.

Field Office Disk Towers

Each field Office has received 3 - 36 gig drives that will be attached to the Compaq 2500 server. The Disk Towers were delivered to the Field Offices by the Field Office SA's during the week of December 13th 1999. The SA's were directed to attach the Disk Towers to the existing servers and let them "spin." After installation in Vernal and GSENM, it is now recommended that the towers be installed on a dual-channel SCSI3 card. This procedure is more complicated given the generation of the servers being compatible with the SCSI cards, i.e. newer drivers for the SCSI cards on the servers. Eileen Lund has completed the configuration in GSENM and is documenting it for installation in the other field offices.

State Office Disk Towers

The State Office has received two towers each with 5 - 36 gig drives that will be attached to the Compaq 800 server by February 25, 2000. Following implementation, the disks currently attached to the USO GIS MUP will be tested for NT compatibility. If compatible, they will be

attached to the Compaq 800 server to provide additional data storage. Time frames will be set forth in the implementation schedule.

GIS Workstations

Included in the tech refresh will be GIS NT workstations to replace existing GIS 250 workstations. Field Office SA's are responsible for identifying the users assigned to the GIS workstations at the time the State tech refresh is implemented. The Field Office SA's may, at their discretion, install these workstations prior to the tech refresh implementation by USO IRM staff. The tech refresh is expected to be completed by May 1, 2000 statewide. Time frames will be set forth in the implementation schedule. Appendix A identifies workstation, disk tower and server distribution.

Plotter/Printer Configuration

The attached Appendix D sets forth plotter/printer configuration, locations as well as established naming conventions.

(Jerry will supply configuration in Appendix B)

Digitizing Tablets

Two models of digitizing tablets are know to exist in various field offices; the Altek 40 and the Altek 41. The digitizing tablets may be attached to GIS NT workstations at field office discretion and not addressed in the implementation phase. See Appendix E for specific information and configurations.

(Jerry working on Appendix C)

Backup Devices

All Field Offices will have an ATL 200 Desktop Robotic backup device attached to the Compaq 2500 GIS server. Project and user data will continue to be backed-up at the originating/FO level. Corporate data will be backed-up at the SO level.

2.1.2  Software

The following sections describe the commercial off-the-shelf (COTS) software used and programs and scripts that have been written for this GIS implementation.

**Servers**:

Rehosting Existing Scripts

Rehosting and recoding the existing AMLs will follow the set of design standards listed below.

Windows NT AML Design Standards:

A separate set of AMLS will be written for the NT platform.

The NT AMLs will be written in a modular format.

As much of the present UNIX system functionality will be converted to AML as possible so the operating system is no longer an issue.

UNIX system functionality that can not be accommodated by AML will be written with NT batch files, e.g. the FTP process for public coverages.

The NT AMLs will only perform the LIBRARY updates and will not schedule jobs.  That will be done with a scheduler and will be handled by the replication software.

A log directory will be created under the "M"drive to store the error log files.  Use AML to manage this directory and clean up outdated files.  If possible an "email" solution on the NT platform will be written.

Specific Tasks and Windows NT AML Design Considerations to be Addressed:

Evaluated the continued use of "gzip" to compress the .e00 files.

Replace "metasummary.ksh" with AML functionality.  (Updates the corporate metasummary files.)

Replace "ftpsgid.ksh" with NT batch file code.  See example files listed below:

Batch File: test.cmd for ftp process

```
rem File to do initial setup for ftp
set directory=D:\michael
set host=137.227.119.100
set login=anonymous
set pw=jsempek@ut.blm.gov
d:
cd %directory%
ftp -s:instruct.txt %host%
```

instruct.txt:  File used by the last line of above file:

```
anonymous
jsempek@ut.blm.gov
ascii
prompt
hash
cd pub
put test.txt
ls -la
bye
```

test.txt: this is a test file used for the above ftp process

```
This is a test document for ftp purposes.
```

Check the "fgdchdr.aml" for NT conversion needs.

Check the "fgdcmetasum.aml" for NT conversion needs.

This task will be accomplished prior to the beginning of replication testing and will be accomplished by a combination of in-house and external expertise.

Replication Software

The NT replication software will check the LIBRARY for new files on a nightly basis and replicate as necessary.  Replication for each field office will be on a staggered schedule.

One replication software (Robocopy) has been tested by IRM on a limited test basis, i.e., small amount of data, replicating to only one office with no open files.  Further and more intensive replication testing will be done between two detached offices over the Wide Area Network (WAN) to identify the correct setting for Robocopy to do proper replication, to evaluate the effectiveness of replicating large data sets, identifying issues with open files, and

setting the archive bit to determine if there is interference with backups.  Replication testing will be completed prior to full GIS implementation.

A replication test plan will be developed and implemented.

Operating System Configuration

Directory Structure

All spatial data is managed through a hierarchical directory structure.  All corporate and collaborative project data are in subdirectories under M:\.  Directory and filenames should be no more than 8 characters.  At a minimum the first 8 characters of all GIS related directories and files must be unique.  Corporate directories are generally owned by the arcdata user and arcdata group with read/write permissions to both user and group.  NT clients map out \arcdata to the M: drive letter.

The directory scheme for the USO NT server is graphically depicted in Figure 1.  The directory scheme for the Field Office Compaq 2500 clients is depicted in Figure 2.  The functions and user permissions of various directories and work spaces in this scheme are discussed in the sections that follow.

**Figure 1** USO NT Server Directory Scheme

```
arcdata on'gis-ut')  M:\                                              P:(?)   (Future need?)

             |                                                          |          |
                                                                      \plots   \arcdatax¹

      _____|_____
      |        |        |        |        |        |        |        |        |        |        |
    \docs   \grids   \images  \library  \projects \symbols \routes  \tables   \tins    \tools  \trashcan
      |        |        |        |        |                          |                  |
   \subject1² \grids1³ \images1³\library1³ \project1³      \table1          \aml*
   \subject2  \grids2  \images2 \library2  \project2                \table2          \av*
   \subjectx  \gridsx  \imagesx \libraryx  \projectx                \tablex          \gps_dd
                       \imcat

   1  x is a number issued in chronological order (ex: /arcdata1 /arcdata2)
   2  subdirectory naming would follow conventions discussed under Directory Description
   red indicates directories that will be replicated to the field offices
```
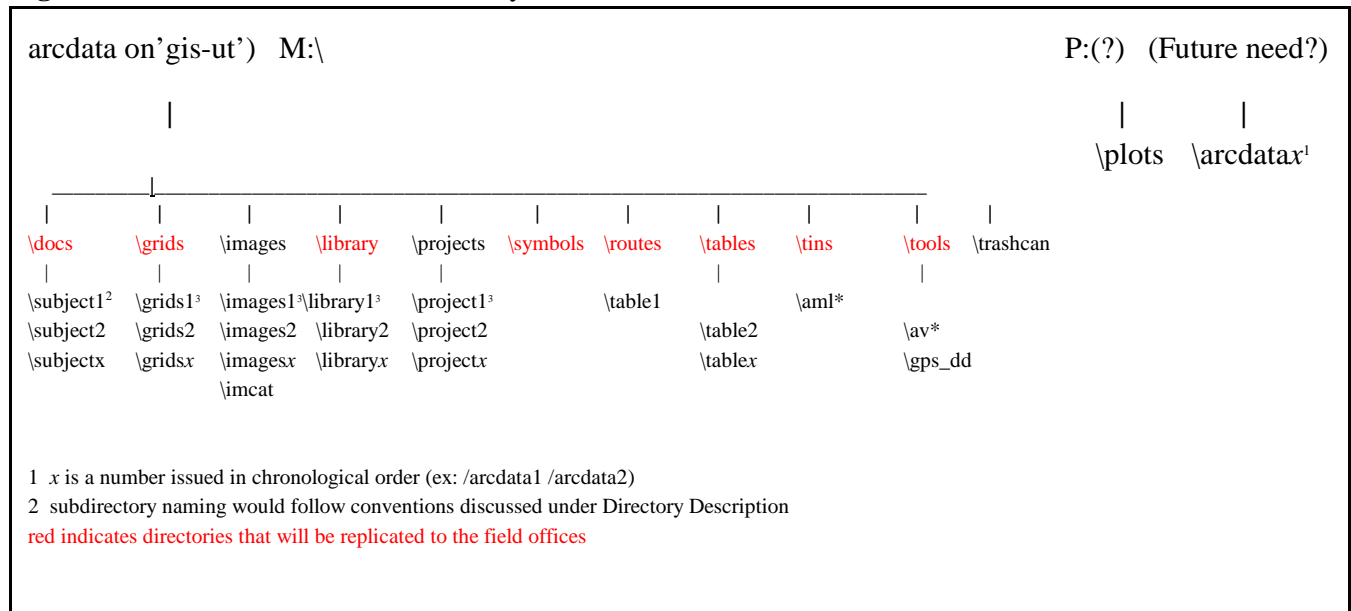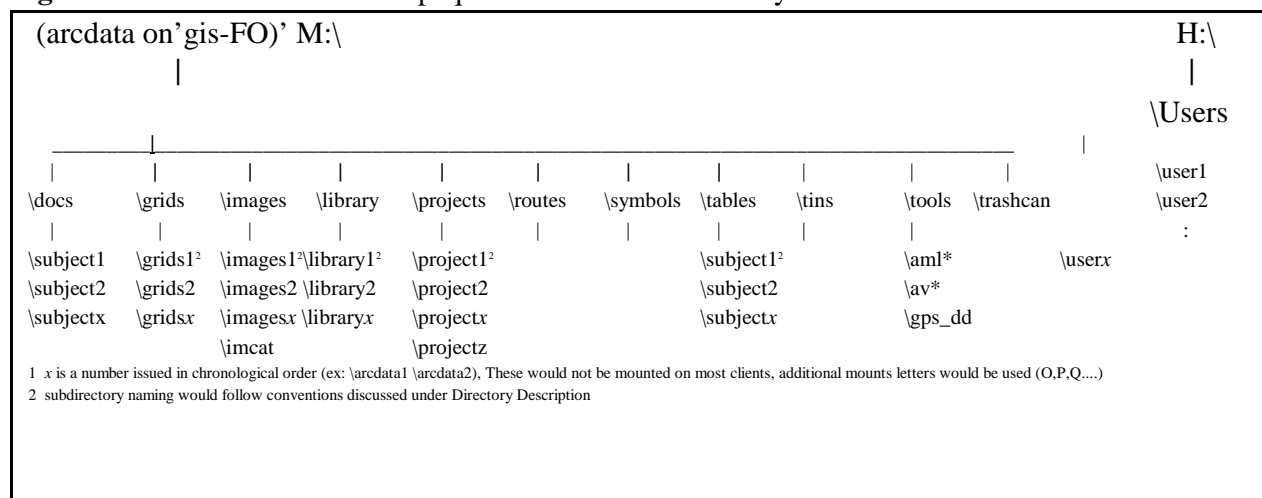
Directory Description

**Figure 2** Field Office Compaq 2500 NT Client Directory Scheme

```
 (arcdata on'gis-FO)' M:\                                                          H:\
            |                                                                        |
                                                                                  \Users

      _____|_____           |
      |        |        |        |        |        |        |        |        |        |        |        |       \user1
    \docs   \grids   \images  \library  \projects \routes  \symbols \tables  \tins    \tools  \trashcan        \user2
      |        |        |        |        |        |        |        |        |        |                          :
   \subject1  \grids1² \images1²\library1² \project1²              \subject1²        \aml*            \userx
   \subject2  \grids2  \images2 \library2  \project2              \subject2          \av*
   \subjectx  \gridsx  \imagesx \libraryx  \projectx              \subjectx          \gps_dd
                       \imcat            \projectz
 1  x is a number issued in chronological order (ex: \arcdata1 \arcdata2), These would not be mounted on most clients, additional mounts letters would be used (O,P,Q....)
 2  subdirectory naming would follow conventions discussed under Directory Description
```

m:\

Purpose:  The primary directory for shared GIS directories, work spaces, and files.  Most
directories are listed in alphabetic order, so \arcdata can be reached without scrolling.


m:\docs

Purpose: Repository for corporate documents (text, wordperfect, or html) which can be
directly or indirectly related to corporate spatial data.  This data is commonly used in

ArcView hotlinks, examples include management prescriptions, free text spatial feature description etc.

Procedures:  Subdirectory names should use the data category prefix (see Appendix D).  Each subdirectory should have a metadata subdirectory with a metasummary file describing the subdirectory documents and their relationship to each other and GIS covers.  Table names should identify table contents, and related GIS covers (ex: M:\tables\hd_hydro\hdwco.txt).  Directory and subdirectory permissions are generally "full control" for USO Library Administrator(s).  All others have "read only" access.

m:\grids
Purpose:  Contains all corporate grid and lattice data.  Multiple tiled grids such as individual 7.5' dems should be placed in subdirectories.

Procedures:  Subdirectory names should use the two character data category prefix and an extension if deemed necessary (see Appendix D).  Grid names should either use the 2 character prefix and/or extension, and should also use a character string either indicating the type of grid and/or geographic extent (ex: M: \grids \ph_dem \e38109a1).  Project specific grids should reside in their related \arcdata\projects directory.   Directory and subdirectory permissions are generally "full control" for USO Library Administrator(s).  All others have "read only" access.

m:\images
Purpose:  Contains all corporate spatial and non spatial images in subdirectories.

Procedures: Since these data sets are static, they will not be automatically replicated.  The corporate image data will be distributed on media (tapes, CD's, etc.) and will reside in each field office for the respective map extent.  The USO will maintain a copy of the statewide corporate image data as well.  Subdirectory names should either indicate the type of image and/or geographic extent.  File names should either indicate the type of image and/or geographic extent (ex: M:\images\drg38109\e38109a1).  Project specific images should reside in their related M:\projects directory.  All image catalogs should reside in both the M:\images\imcat and the M:\images\imcat\info directories.  The standard file formats will be .tiff for DRGs and .bil for DOQQs.  Other imagery, i.e. Landsat scenes, etc. will reside in their native format.   Directory and subdirectory permissions are generally "full control" for Field Office Dealmakers.  All others have "read only" access.

m:\library\*library*

Purpose:  Directory component of the Arc librarian system.  Repository for all corporate vector data.  An additional repository for corporate vector covers may be necessary for use with dynamic segmentation (see M:\routes).

Procedures:     In addition to the standard arc library subdirectories, each arc library will have a .\metadata.  The .\metadata directory has the mp parsable metafile and mp parsed html, and sgml file for each cover in the library.    Directory and subdirectory permissions are generally "full control" for USO Library Administrator(s).  All others have "read only" access.

m:\projects\project*x*
Purpose:  Arc workspaces for collaborative GIS projects.  Contains project specific data, tables, images, tools, plotfiles, and ArcView .apr files.  Most projects are short term, however permanent projects may also exist.  Projects are typically used for GIS data development, GIS analysis, management plans, environmental assessments etc.  Many projects generate corporate data that are eventually added to the library.
Collaborative projects between offices should be avoided but can be accommodated through shares.  Performance is an issue, so the office with the most interaction with the collaborative project should access it through the LAN, and the offices with the least interaction should access it through the WAN.

Procedures:  Project subdirectory names should either indicate geographic extent, geographic area, and/or project subject.  Using a combined extent and subject is preferred (ex: lk_mp =  lockhart basin management plan).  All projects will have a Readme text file which describes the purpose of the project, project manager, and an abstract element for each data set in the project.  Large projects will also have a metadata directory with fully compliant metadata.
The permission set for M:/projects is "full control" for Field Office Dealmakers.  All projects have a project owner, who also owns the project subdirectory.  Group and other permissions will vary by project.  All projects will have a metadata directory where at a minimum a metasummary file will be maintained.  Once projects are completed, the projects are archived and deleted.  See x.x for detail on GIS project organization scheme.

m:\routes
Purpose:  A repository for corporate routes.  Tile based vector database managers such as Arc Librarian and ArcStorm cannot deal with route subclasses, and therefore must be managed outside of either Librarian or ArcStorm..

Procedure:  Subdirectory names should use the two character data category prefix and an extension if deemed necessary (see appendix D).  Route names should either use the two

character prefix and/or extension, and should also use a character string either indicating the type of route and/or geographic extent (ex: M:\grids\ph_dem\e38109a1).  Project specific routes should reside in their related M:\projects directory.   Directory and subdirectory permissions are generally "full control" for USO Library Administrator(s). All others have "read only" access.

m:\symbols
Purpose:  A repository for corporate logos, symbols, images, shapes, symbolsets and pallets commonly used for cartographic production.

Procedures:  A Readme text file will describe all the objects in the directory.   Directory and subdirectory permissions are generally "full control" for USO Library Administrator(s).  All others have "read only" access.

m:\tables
Purpose:  A repository for corporate tables (txt, dbf, info) which can be directly or indirectly related to library covers.  Large corporate tables may be centrally stored on an RDBMS in the USO.

Procedures:  Subdirectory names should use the data category prefix (see Appendix D). Each subdirectory should have a metadata subdirectory with a metasummary file describing the subdirectory tables and their relationship to each other and GIS covers. Table names should identify table contents, and related GIS covers (ex: M:\tables\hd_hydro\hdwco.dbf).   Directory and subdirectory permissions are generally "full control" for USO Library Administrator(s).  All others have "read only" access.

m:\tins
Purpose: A repository of all corporate tins.
Procedure: (needs info)

m:\tools
Purpose:  A repository of all corporate GIS related automation tools (amls, avenue, shell scripts, compiled programs, gps data dictionaries etc) that have broad application.  Project specific automation tools should be in their respective M:\projects subdirectories.

Procedures:  Subdirectory names and tool names should indicate the type of tool, and the tool function.  All tools must have a standard (an 8 line) header with the tool name, author, description, and dates.  All tools should be designed for platform independence by having the tool determine the executing platform and setting an appropriate path environment variable.   Tools should also provide a description and usage when run with a "?"

argument or through a button.  Each subdirectory should have a metasummary file describing the subdirectory tools <mark>(see I.D.3 System Setup-scheduling).</mark>    Directory and subdirectory permissions are generally "full control" for USO Library Administrator(s). All others have "read only" access.

m:\trashcan
Purpose:  An optional directory with open permissions.  Usually a temporary repository of imported data,  used for convenience when data has not yet been standardized or documented, but has some interim use.

Procedures:  Directory and subdirectory permissions are rwxrwxrwx..  The GIS administrator monitors this directory, and cleans out old data that has lost its usefulness.

n:\arcdatax...... x:\arcdatax:
Purpose: This is an optional high end user, or special project workspace.  To be used when disk space requirements are high, when data doesn't need to be shared, and where projects are temporary, where the disk are on the user's machine for improved performance, but some file sharing is still needed. The file systems may be mapped to several user workstations from the server, or the file systems may physically reside a user's client machine and mapped to the server and other workstations as needed.

Procedures:  Subdirectory names should either indicate geographic extent, geographic area, owner, and/or project subject.  The permission set for \arcdatax is "full control" for Field Office Dealmakers.  The subdirectories are typically owned by the user who has read, write, modify access.

o:\plots ..........x:\plots
Purpose:  An optional temporary workspace for arcpress, and a temporary storage area for plotfiles.  This network drive has been useful for clients many of which have little spare disk space.  Directory and subdirectory permissions are generally "full control" for Field Office Dealmakers.  All others have "read, write, modify" access.

Procedures: Plot files more than 7 days old will be deleted.  An automated process is being developed to accomplish this task.


Home Directory (h:\fo_name\Users\username)

Purpose:  Repository for user data, images, tools, plotfiles, and .apr files. As the usefulness expands beyond a single user, these objects should be moved to a collaborative project, or a corporate directory or library.

Procedures:  Subdirectories are created, and managed by users.

Scheduling Software

Replication will be scheduled nightly using "AT" or "Scheduler" or "Soon".  These utilities will be evaluated and a solution will be selected and used with Robocopy.

Scheduled Automated Jobs
Daily:

- The standard header (first 8) lines of each tool in every tools subdirectory are concatenated into metasummary files on the USO NT GIS server.
- Incremental backup of M:/
- Run fgdchdr in all corporate metadata directories to update the header and summary html files on the USO NT GIS server.
- The USO NT GIS server replicates corporate metadata directories to the field office NT GIS servers.  (M:/library/libraryx/metadata; M:/grids/metadata; M:/images/metadata)
- The USO NT GIS server replicates the M:/tools and M:/symbols directories  to the field office NT GIS servers.
- Run the FTP batch file to send metadata for public GIS data to the AGRC clearinghouse.

Weekly
- Complete backup of M:\ on the USO NT GIS server.

Paging Space
Paging space of 512 MG will be created on each NT GIS server.  If a need for additional space is discovered during the testing phase, it will be increased to meet requirements.

Host Naming Conventions
All NT GIS servers will be named GIS (office name). An example for the Vernal FO would be GIS-VFO.

Environment Configuration
Environment variables will be set on the server according to the VDD. (see Appendix E)

Application Software

A server/client configuration of ArcInfo will be installed on the GIS servers by the Field Office SA's. State Office SA's will provide the VDD (see Appendix E). State Office assistance will be provided if requested. After initial implementation FO SA's may choose to install additional client-based ArcInfo applications to meet processing needs.

**Licensing**

ArcInfo & Modules
At present the ArcInfo licenses reside on the AIX MUPS. Since the MUPs will remain in place, this scenario will continue for implementation. When the Unix MUPs are removed, the licenses will have to be converted to the NT platform.

ArcView & Extensions
Following discussions with the Environmental System Research Institute (ESRI) representative to BLM, National Information Resources Management Center (NIRMC) managers, and Utah State Office IRM staff, the salient points regarding the use of ArcView and ArcView extensions by Utah BLM personnel are as follows:

1. BLM has expended significant amounts of funding (millions of dollars) to ESRI for GIS software through the Bureau wide contract to make this software available for use.

2. For licensing purposes, ESRI and BLM are concerned about the number of concurrent users, not the number of software copies loaded on computer workstations.

3. Until ESRI builds an ArcView license manager for Windows NT/2000, we are on the honor system to track numbers of concurrent ArcView users. GIS dealmakers and FO System Administrators should work together to perform this task.

4. For ArcView licensing purposes, each FO is not contracting separately with ESRI for ArcView licenses, but is considered part of the Utah BLM organization. Utah BLM has 58 ArcView licenses assigned throughout the state and at this point does not have 58 concurrent ArcView users.

5. Since BLM has a contract in place with ESRI and has expended significant funds to procure ArcView GIS licenses, its use by resource specialists should not be overly restricted. GIS Dealmakers and FO SA's should get a handle on the number of concurrent users. If we can document that the number of concurrent ArcView users is consistently exceeding the number of ArcView licenses Utah BLM holds on a statewide basis, then we should acquire more licenses or restrict usage.

PF Office (GPS)

PF Office can be installed on workstations by FO SA's as needed during implementation.

**Workstations:**

Erdas Imagine
The offices with licenses will be converted to NT when other equipment is converted. The SO will load NT compatible software where licenses already exist.

Operating System Configuration

Paging Space
Paging space of 512 MG will be created on each NT GIS server. If a need for additional space is discovered during the testing phase, it will be increased to meet requirements.

Environment Configuration
Environment variables will be set on the workstation according to the VDD. (See Appendix E)

Application Software
A server/client configuration of ArcInfo will be installed on the GIS servers by the Field Office SA's. State Office SA's will provide the VDD (instructions). Assistance will be provided if requested. After initial implementation FO SA's may choose to install additional client-based ArcInfo applications to meet processing needs.

**Network Configuration**

Switch upgrade to 10/100 for all offices has been completed. All Utah FO's are connected to the BLM WAN with T1 line connections, with the exception of the Escalante FO which has a 56k connection. The St. George FO is connected to the Arizona network, which does not allow a direct replication since we cannot connect directly to that server. A work around will be investigated to allow replication to occur to the St. George FO.

2.1.3  Personnel/Staff Roles and Responsibilities related to H/S implementation

Organization Structure and Location,
Personnel with major responsibilities to implement the Utah BLM GIS plan are located in the Utah State Office and in twelve BLM Field Offices. The GIS Program Manager is the lead in this effort and the dealmakers around the state are fundamental to a successful implementation. Effective system administration and network support is critical for the successful deployment of this system and continued IRM support is required to keep the system operational on a day to day basis.

The priority for all personnel is the initial deployment of hardware and the installation of the GIS geospatial replication system. Included in the deployment is all necessary work to test software and refine processes and procedures to optimize the system. Following the deployment, priorities for personnel then shift to tasks required for a maintenance and operation mode.

## Information Resource Management (IRM) Roles

As mentioned previously, timely and effective IRM support is crucial if this system is to be implemented on time and function as designed.

### Tele-communications/Network Support

The GIS replication system is dependent on the wide area network (WAN) functioning in a dependable and consistent manner. Some field offices have network lines that need to be upgraded to increase transmission speed and band width. Routers and hubs and other equipment necessary for the WAN must function on a routine basis and may have to be upgraded as technology changes. USO IRM staff will provide the lead, coordinate with field office system administrators and be ultimately responsible for these functions.

### State Office Systems Administrator (SA)

USO systems administrations will have the training and expertise to provide efficient, effective, and timely support to install and maintain hardware, operating system software, and replication software. Equally critical for GIS to properly function is the creation of a user group with correct permissions to read, write, and execute the various files. USO SA's will be responsible for the initial deployment and for coordinating with, supporting, and training the field office system administrators to maintain the hardware and software in each field office.

### Field Office Systems Administrator (SA)

Field Office SA's will participate in the deployment to fully understand system functionality and to lay the ground work for continued maintenance support. If GIS is to function properly at the field office level, computer hardware, operating system software, and replication software should be maintained on a routine basis at the local level. The field office system administrators will have the training and capability to perform these tasks and should consult with USO SA's to solve more complicated problems.

### Configuration Management

USO SAs should perform the leadership functions and coordinate with USO GIS personnel and local system administrators to monitor changes in technology and adjust the statewide geospatial data replication configuration to maintain a viable and effective system.

Other IRM Resources

As noted above, a properly functioning GIS is critical for Utah BLM to implement the Bureau's mission. GIS is dependent on a properly functioning network and computer hardware and software. Other resources will be identified and vehicles put in place by the GIS Program Manager in the event that USO BLM IRM staff is unable to perform the necessary support functions in a timely and effective manner. Two types of vehicles or mechanisms could be used. One mechanism could be a performance standard against which the need for additional IRM resources is measured. For example, if a significant problem is not solved within two days, other IRM resources are called in to correct the problem.

The second type of vehicle to secure additional IRM resources is existing or new assistance agreements and contracts. Two national BLM in-house resources are available. NIRMC could be used for replication software testing. NARSC has a contractor, TRW, on board that could be called on to perform special support tasks. Other resources, such as AGRC, may be available in Utah to perform similar functions and these possibilities should be investigated and agreements put in place to call on them when necessary.

GIS Implementation Project Manager

The project manager is responsible for the preparation of the Utah BLM GIS Implementation Plan. These tasks include coordinating all aspects of the planning process including meetings, assigning tasks to personnel, and getting management approval for the plan and support for implementation.

GIS Program Manager Role

The State Office GIS program manager designs and implements the GIS and develops operating procedures, and oversees GIS operations statewide. The GIS program manager coordinates with State Office and Field Office System Administrators to assign project owners and system permissions under M:\arcdata. The GIS manager works with IRM and systems administrators and others to ensure designs are kept current with the technology and BLM needs, and sees that these designs are properly implemented. This position is also responsible for identifying statewide GIS training programs and leading the training effort through in-house means or by arranging for outside training. This individual also coordinates with IRM to track and manage GIS licenses statewide. The State Office GIS program manager ensures corporate vector data is managed through Arc Librarian and that the libraries are synchronized.

State Office Library Administrators

State Office Library Administrators use custom tools to perform and monitor library updates, and ensure that all data has FGDC compliant metadata and help to assure that data standards

are adhered to.  These administrators are composed of the GIS program manager and State Office Dealmakers.

State Office Dealmakers

These primary points of contact for field office dealmakers and for all GIS related activity in the state office and help field office dealmakers determine whether new data is corporate, collaborative/project or user data.  They help field office dealmakers assure that data standards are adhered to and provide GIS user support to FO dealmakers, sufficient training and support will be provided in order to perform this task.  They use GIS to perform spatial analysis and produce geospatial products in support of the BLM mission for statewide projects.

Field Office Dealmakers

Field Office Dealmakers are the primary point of contact in each field office for all GIS related activity and help determine whether new data is corporate, collaborative/project or user data.  They help assure that data standards are adhered to and provide GIS user support to local resource specialists.  They use GIS to perform spatial analysis and produce geospatial products in support of the BLM mission.  Sufficient training and support will be provided in order to perform this task.

2.1.4  Needs as they relate to hardware/software implementation

Training Needs

This section identifies additional training requirements in order to implement the preferred GIS design in Utah.

USO/FO SA Training

System Administrators at the SO level need to be trained in the installation and maintenance of the replication software.  FO SA's should have a basic understanding of the replication process and the library/directory structure.  All SA's should also receive basic ARC/INFO administration training to develop an understanding of the software structure and organization.

GIS/SA Cross-Training

GIS dealmakers in the USO and in the support field offices should receive basic introduction system administration training to allow them to perform routine tasks to maintain the GIS computers.  Dealmakers that show an ability to perform at a higher level should receive additional training to increase their capabilities and to provide additional system administration resources available to keep the GIS operational.

Library Administration

All dealmakers will receive library administration training to provide a basic understanding of the system. USO staff responsible for adding corporate data to the library should receive more in depth training to allow competent performance. Following implementation of this design, additional training will be required as the technology evolves and mechanisms are available for implementation.

Budget/Training Requirements

Staffing Needs

As the use of GIS becomes more fully integrated into the normal day to day business practices of Utah BLM, competent and professionally trained staff will be essential to develop accurate and useful geospatial data and to produce the required GIS products. Management should recognize the importance of retaining a professional GIS staff to support the routinely needed GIS products that managers will rely on to make resource management decisions.

GIS Responsibilities/Collateral duties

The GIS program manager position should be a full time position with a minimum of collateral duties to allow this person to focus on a successful statewide GIS implementation. At the field office level, collateral duties may be an acceptable situation for the GIS dealmaker as they begin a transition into GIS duties. However, this should be considered a short term situation, because these positions will soon become overloaded with requests to produce GIS products and to support resource specialists in their day to day duties. Managers should recognize this situation and re-evaluate staffing priorities and workloads to accommodate and meet increased GIS production demands.

Training

Funding requirements for additional training will continue to be needed after the GIS is deployed in Utah BLM. Future needs will be for additional ARC/INFO module (ARC/INFO ver. 8, GRID, AML, Arcview, Avenue, etc.) training of dealmakers and resource specialists. Training will also be required for Library Administrators to manage geospatial data and to implement new data serving technologies and software such as SDE.

In order to develop a competent and capable GIS staff, dealmakers should complete a training program of in house, NTC courses and additional vendor offered courses. This training program will be developed at the USO level following the initial GIS implementation process.

2.2  Data Management

2.2.1   Task List/Description

Initial Creation of Utah Corporate Data
The arc library structure has already been established in Moab (see below) and Moab's corporate data has already been determined to have FGDC compliant metadata. Therefore, Moab's current libraries for corporate data contain all corporate data that exist to date upon initial implementation Moab's corporate data will become the corporate data for Utah. Other offices will submit proposed corporate data files to the SO Library Administrator (s). The SO Library Administrator (s) will assure that corporate data adheres to standards and ensure that all data has FGDC compliant metadata.

ARC Libraries
The Arc libraries are the primary storage areas for corporate vector data. Routes need to be stored in \arcdata\routes to use them with dynamic segmentation.

Main Library
Each office has a main library. This library is the repository for most data. A cover's topology must be such that performance is satisfactory using .5 x 1 degree tiles, and the cover's extent is equal to or smaller than the library which includes a 1 x 1 lat/long degree border around Utah.

The tiling scheme is based on performance and ease of use. The main library uses a .5 x 1 degree tiling scheme. Tile names follow the Ohio code for the lower right hand corner of the tile. The library projection is UTM zone12, NAD27.

Large scale Library
An arc library with smaller tiles intended for large scale data with high topological density.

The large scale library uses a 7.5' x 7.5' tiling scheme. Tile names follow the Ohio code for the lower right hand corner of the tile. The library projection is UTM zone12, NAD27.

Small scale Library
An arc library with either a single tile or several large tiles, primarily for small scale data whose extent is equal to or smaller than the entire Colorado plateau and Intermountain region.

The small scale library uses a 1 x 1 degree tiling scheme, and contains data whose source scale is >250k. The tiles and extent of this library may need to be extended. to

a 2 x 2 or 3 x 3 degree tiling scheme.    Tile names follow the Ohio code for the lower right hand corner of the tile.  The library projection is UTM zone12, NAD27.

Lat-long Library
A lat-long library with a 360 x 360 degree extent.  This library is intended primarily for small scale cartographic production and/or where using another projection aside from UTM zone 12 is desirable.

The lat-long library should use a 1 - 4 tile tiling scheme.


Library Layer/Cover Naming Conventions

Cover naming conventions are hierarchical.  The first 2 characters define a broad data category (see Appendix D).  The next 3 characters define the specific cover type (this could vary from 2-4).  The next set of characters define the specific cover (1-2).  These last characters are usually a number assigned in the chronological order in which they're placed in the library.  The total number of characters should not exceed 8.

Naming convention:
aabbb11
a       a broad class of data (ex wi = wildlife)
b       a specific cover type (ex bbe = black bear habitat)
1       specific cover, one in a series (1 = the first black bear habitat placed in the main library)
ex: wibbe1, trrds1, trrds2, trrds3, trrds4

Arc libraries refer to covers through a layer name which can exceed 8.3 file name limits. The layer names use the data category and specific cover code followed by a _ followed by an understandable character sequence that identifies the specific cover.  The total string cannot exceed 16 characters.  Typically the extension may identify scale or source.  When the broad class and cover type adequately defines a layer, no extension is needed (ex: wibbe, trrds_24k, trrds_100k, trrds_rr4w).

Library Directory Structure
The organization of map libraries uses the operating system's hierarchical directory structure. The libraries are centrally located under M:\library.  As the libraries grow, or as performance tuning demands, the libraries and library tiles may be divided among separate directories, drives, volume groups and logical volumes.  These changes will be invisible to the users

Synchronized Libraries
The library scheme between offices is hierarchical.  The Utah State office houses the primary libraries while the libraries in all field offices are branch libraries.  All libraries contain identical data sets with the identical geographic extent.  Anytime the primary library is changed, that same change is replicated to the branch libraries.  Synchronization is greatly aided through a set of tools used during library updates.  To ensure that the libraries stay synchronized, distributing periodic (biannual) backups to the branch libraries may be necessary.

Library Tools
All library related tools are located in M:\tools\aml_library.  All tools have a standard 8 line header and provide description and usage when run with a ? extension.  The primary tool, lib_update.aml, synchronizes all libraries when the primary library is updated.

lib_update.aml checks the cover that is about to be put in the library for:
>        cover type
>        layer and cover name existence
>        table designs
>        projection

and then proceeds with the following decision tree and user interaction:

- If the cover/layer names are inconsistent with the library cover/layer names, the AML will not allow the update to proceed.
- If the cover/layer name combination doesn't exist the aml assumes a new cover is being inserted in the library and will create the library layer.
- If the cover/layer exists and the attributing scheme is inconsistent with the library's, the aml warns the user and if the user permits, uses the new cover to establish a new standard for the layer/cover.
- If the cover/layer projection definition doesn't match the libraries, the aml warns the user, and if allowed will redefine the projection to match the libraries.
- If the cover/layer exists and the cover type is a point or line, the aml asks the user whether to perform an update or an append.

The aml continues asking for more covers until all the intended updates have been identified and verified.  Once all the covers have been entered, the actual update can be run immediately or scheduled to run at night.  Large updates are run at night to reduce daytime WAN network traffic.  Any errors occuring during the update procedure are written to a log file which is checked by the user performing the update and is available for viewing by the library administrator.

Library Update Procedures
Update procedures will differ depending on whether the update is: (1) new data that has never been mapped, (2) modified data with a new attributing scheme, (3) modified data with an existing attributing scheme, (4) appending point, line, or polygon data (5) user modified data.  The update must be performed from a machine that has access to the primary libraries, and by someone with read/write and adequate librarian permissions to all the primary libraries.

New data, no prior data or attributing scheme
All corporate data must have an established standard (see I.E).  Once collected, generate the cover, document the cover, and update the library.

Data with a new attributing scheme
Notify all library managers and administrators about the update (see I.E).  All related data has to be extracted from the library.  Preexisting data should be updated to the new standard to the extent possible.  Generate the new cover, document the cover, and update the library.  Notify all library managers and administrators when the update is complete.  Changing attributing schemes on covers can affect ArcView projects that refer to these covers.  Users need to be advised about the change and be given the opportunity to delete the layer from their project prior to the update.

Modified data with no modified attribute scheme
Update procedures for polygon or region features depend on the update extent:

1 tile   Make sure no one else is about to update the same layer/tile combination.  Get the tile, perform the maintenance, make sure all tile boundary arcs are invisible, use mput to update the library, manually update cover documentation.  Notify all library managers and administrators when the update is complete.

2 tiles  Make sure no one else is about to update the same layer/tile combination.  Extract the 2 tiles, perform the maintenance, split the tiles, make sure all tile boundary arcs are invisible, and perform two mput operations, manually update cover documentation.  Notify all library managers and administrators when the update is complete.

2 or     Make sure no one else is about to update the same layer.  Extract the entire layer,
More perform the maintenance, use lib_update to update the library, and run the library
tiles metadata tool to update the documentation.  Notify all library managers and administrators when the update is complete.

Appending point, line, and polygon data

Generate the points lines and polygons to be appended, manually update the corporate cover's documentation, and update the library with the lib_update append option. Appending polygons to the library uses the arc update command which eliminates the preexisting areas that overlie the update polygons.

Library Use
Most users will have read access to most layers in all the libraries. Most ESRI applications can directly access library layers. Referencing layers through Arc applications usually requires identifying the library and layer. ArcView references layers by identifying the library, layer, and extent. Most update and many analytic operations cannot be performed directly on a library layer and require that a copy of the layer be made prior to the operation. In librarian this can be done through an extract operation, while in ArcView, this can be done through a convert to shapefile operation.

Library Standards
The data and library will follow BLM Utah established data standards as described in Section 2.1.2.

Library Metadata
Each library has a /metadata subdirectory. The metadata directory has 2 sets of html documents for each library layer and one metasummary html document summarizing the library contents. This directory also houses the mp parsable *.met and the mp parsed sgml files (see I.F ).

Library Permissions (NOTE: THIS SECTION WILL BE REVISED FOLLOWING REPLICATION TESTING.

Librarian supports 5 access levels:
        none
        browse:         read only
        operator:       read and extract
        manager:        read, extract, write
        administrator:  read, extract, write, assign permissions

These permissions work within the operating system permissions, ie: a manager with write permission must also have the OS write permission in order to change library covers. Likewise, a browse user can change a files through the OS if the user has write permission through the OS.

The OS permissions are set to:

M:\arcdata\library\libraryx *arcdata:arcdata* rwxrwxr-x
M:\arcdata\library\main *arcdata:arcdata* rwxrwxr-w

All library transactions need to take place with umask set to 002. All managers and administrators of the primary library must be a member of the *arcdata* group.

Library Environment Variables
Each library has an index cover (M:/arcdata/library/libraryx/database/index) that contains the name of each tile, the location of each tile workspace, and the presence of data for each layer/tile combination. The tile location uses a path environment variable to add greater flexibility to the library design.

Example, environment variables on USO's server:
$ARCLIBUSO=/arcdata/library
$ARCLIBSLFO=/arcfo/arcslfo/arcdata/library
$ARCLIBCCFO=/arcfo/arcccfo/arcdata/library
$ARCLIBGSFO=/arcfo/arcgsfo/arcdata/library
$ARCLIBDFO=/arcfo/arcdffo/arcdata/library
$ARCLIBKFO=/arcfo/arckfo/arcdata/library
$ARCLIBEFO=/arcfo/arcefo/arcdata/library
$ARCLIBRFO=/arcfo/arcrfo/arcdata/library
$ARCLIBFFO=/arcfo/arcffo/arcdata/library
$ARCLIBVFO=/arcfo/arcvfo/arcdata/library
$ARCLIBMBFO=/arcfo/arcmbfo/arcdata/library
$ARCLIBMTFO=/arcfo/arcmtfo/arcdata/library
$ARCLIBPFO=/arcfo/arcpfo/arcdata/library

Sample tile locations in the main library index cover:
        $ARCLIBMBFO/main/38109a1

Environment variables set for client machines:
AIX:    $ARCLIB*FO*=/arcdata/library
NT:     ARCLIB*FO*=M:/arcdata/library
(Environment variables are significantly different in the preferred design) - See Appendix E

Library Tables
Each instance of an ESRI module refers to the library locator file which contains the name of every map library and the system location of each library reference workspace. NT clients must be able to access their library locator file at $ARCHOME\tables\.

Typical library locator file stanzas for the main library (in Moab).
```
 NAME        =main
 LOCATION    =$ARCLIBMBFO/main/database
 NAME        =pfo_main
 LOCATION    =$ARCLIBPFO/main/database
 NAME        =mtfo_main
 LOCATION    =$ARCLIBMTFO/main/database
 NAME        =mbfo_main
 LOCATION    =$ARCLIBMBFO/main/database
```

Data Standards

> A process has been designed for the development of data standards.  Existing standards are documented in the metadata files and in the data dictionary. If there is no existing standard, the data category teams will work to establish a new standard.  Data category teams need to be created at the statewide level to deal with these issues.  Standards developed by the data category teams will be posted centrally and will be available to the Library Administrator (s) as well as all offices.

Data Sharing

> Initially public Utah corporate data will be shared with and made available to the public by AGRC on their clearing house node.  Field Office's will document public/non-public in their metadata.  The State Office Library Administrator (s) will accomplish this distribution.

Metadata

> Guidance for the collection of, storing of and posting of metadata are more thoroughly discussed in the operations and maintenance document.  GIS specialists, dealmakers, data managers, data collectors all have responsibilities. Each office will need to 1) Acquire a metadata collection tool which is FGDC compliant; 2) Educate resource specialists, managers, and dealmakers in metadata requirements; 3) Have at least one individual trained in using the metadata tool; 4)Have at least one person who knows how and where to look for existing metadata files.

2.2.2    Personnel/Staff Roles & Responsibilities as they relate to GIS Data Management

The following section describes the roles and responsibilities of Utah BLM personnel to manage BLM geospatial data.

Resource Specialists - Metadata

> Executive Order 12906 requires federal agencies to document the geospatial data they collect by describing how and when the data was collected and processed. The Federal Geographic Committee (FGDC) has established standards for format and content of metadata and these

metadata files are to be made available to the national clearinghouse. Metadata becomes a source of information for the public, as well as government agencies and research facilities about what geospatial data is available, how accurate the data is, who collected the information, how it was collected and when it was collected.

The resource specialist is responsible for completing the metadata form to document how the data was collected, the accuracy, attribute coding and other information as called out on the form. Resource specialist will often be asked to serve on data category teams.

SO Library Administrator (s)

Reviews proposed corporate data layers and changes to corporate data to assure compliance with data standards, FGDC metadata requirements, data ownership and permissions.

Dealmakers

Dealmakers are the primary point of contact in each field office for all GIS related activity. They help determine whether new data is corporate, collaborative/project or user data. They help assure that data standards are adhered to and are resources to help complete corporate metadata. Assist resource specialist in using GIS tools and data to meet their needs.

State GIS Database Administrator

Advises and leads data category teams on establishing data standards maintains the Utah Data Standards Dictionary and advises other offices on metadata requirements.

Data Category Standards Teams

These teams will coordinate and define data standards at the FO and statewide levels. Statewide teams will typically include two to four members with expertise in the relevant field and include at least 1 person familiar with data modeling and design. For example the (HD) hydrography data category team would be staffed with hydrologists and a dealmaker. An individual may be a member of several teams, and a single team may be responsible for several data categories.

Data category teams develop data standards as well as standard procedures for updating files and quality assurance procedures. Team members will include 2-4 individuals with expertise in a particular field (geology, range, wildlife etc.) And at least one individual familiar with data modeling and design. An individual may be a member of several teams, and a single team may be responsible for several data categories.

Data category teams will be created at a statewide level to establish data standards for corporate data and may review standards for collaborative/project data. It is recommended

that field offices create data category teams to facilitate the development of data standards for local project needs and to expedite the review of corporate standards.

Once it has been determined that there is a need to collect data and no adequate data standard exists, a standard will be developed. New or modified data standards can be proposed by an individual or data category team at any level of the organization. Anyone can request that a state or field level data category team develop a standard, or set of standards. If an individual or group in a field office does not feel that a statewide team can develop a corporate standard in time to meet their data collection needs, they can develop a proposed standard and send it to the state team and appropriate individuals around the state, requesting a timely review (1-2 weeks).

Corporate data standards need to be reviewed by individuals throughout the state and approved by the state data category team. New standards should be documented for all collaborative and corporate data. There will be a site on the intra/inter-net for posting data standards. Changes to a corporate standard should also include a plan for data conversion.

Field Office Manager

Field office managers set priorities, and provide adequate staff, training, and budget allocations to maintain each office's GIS.

2.2.3    Needs following initial implementation

Training Needs

Metadata tools
Overview of FGDC Metadata standards
Data Modeling
Overview of BLM library structure
Overview of processes and procedures–roles & responsibilities

Documentation/Operations Guide

An Operations and Maintenance guide will be developed using the Implementation Plan as a guide.

2.2.4    Schedule Overview

See Appendix F - GIS Implementation Schedule.

# Appendix A

# Statewide Server, Disk Tower and Workstation Deployment

**Appendix A**

## Utah BLM Statewide GIS Hardware
## Distribution Table

| Office Location and Point of Contact | Number of NT Compaq 2500 GIS Servers to be Deployed | Number of GIS Server Disk Towers to be Deployed | Number of GIS NT Workstations to be Deployed |
|---|---|---|---|
| Utah State Office c/o Phil Garcia | 1 | 1 | 4 |
| Fillmore Field Office c/o Marjean Christensen | 1 | 1 | 1 |
| Salt Lake Field Office c/o Jay Cram | 1 | 1 | 1 |
| Cedar City District Office c/o Eileen Lund | 1 | 1 | 3 |
| GSENM Hdqrts Office (Kanab) c/o Eileen Lund | 1 | 1 | ? |
| Dixie Field Office c/o Ron Ray | 0 | 0 | 0 |
| Kanab Field Office c/o JoAnn Schreiner | 1 | 1 | 1 |
| Escalante Field Station c/o Paula Shakespear | 1 | 1 | 1 |
| Richfield Field Office c/o Wendie Nay | 1 | 1 | 1 |
| Hanksville Field Station c/o Sue Fivecoat | 1 | 1 | 1 |
| Moab Field Office c/o Petenia Pfnister | 1 | 1 | 1 |
| Price Field Office c/o Ann Lambertsen | 1 | 1 | 1 |
| Vernal Field Office c/o Tanya Bullock | 1 | 1 | 1 |
| Monticello Field Office c/o B. J. Mortensen | 1 | 1 | 1 |

# Appendix B


# Plotter/Printer Configuration


**(Forthcoming)**

# Appendix C


# Digitizing Tablet Configuration


**(Forthcoming)**

# Appendix D


# Data Categories

# DATA CATEGORIES

(from Utah BLM GIS Implementation Plan - 2000)

Data cannot always be clearly classified into distinct categories, however organizing data in this manner improves the accessibility, and administration of the database. The current system uses these categories in directory, file, and data set naming conventions. The following criteria are being used to develop data categories and assigning data to a category. Data that could belong to more than one category will be assigned to one, and the metadata, and metadata queries will reflect these cross category relationships.

Criteria for developing and assigning data category names:
- ▸ Use AGRC's 2 character code except if a BLM program already deals with the category and the 2 character code doesn't match the BLM program name.
- ▸ Have a separate category for each BLM subactivity that deals with spatial data, if not already covered by an AGRC or another broader category . This should help identify data stewards and owners.

Criteria for assigning a cover to a category:
- ▸ A resource cover should only be placed in a BLM program category when there is not a separate resource category. Use judgement in selecting an appropriate category when several categories may apply.
- ▸ Some covers which could be aggregated may be aggregate for data management purposes. For example, facilities could be grouped in one cover in one data category CF, however dissaggragating the spatial data may be advised as there are several related databases that tie to different programs (ie: water monitoring (HD), recreation (RE), range (RA), wildlife (WL) and FIMMS (CF) related facilities).

**Categories:**

**AO[1]    Administrative, Ownership, Political, Special Designations**
Data are political designations or are human created delineations that do not follow on the ground features. Examples include state, and county boundaries, ownership, field office boundaries, Census boundaries, ACEC's, Wilderness areas

**AC[3]    Air/climate**
Data relating to the atmosphere and part of the air/water/soils program. Includes: air quality, precipitation, temperature, solar radiation.

**AV[4]    Aviation**
Data relating to aviation. Includes flight hazards, flight routes, restricted airspace

**CF[2]    Constructed Features**
Data related to geographic features constructed or influenced by humans not covered elsewhere  Related categories TR, RE, RA, LA, HD.. Data includes: service facilities, building footprints,

**CU[3]     Cultural**

Data related to the cultural program.  Includes: cultural sites, cultural surveys,


**DE[1]     Demographic**

Data related to demographic, social, economic and lifestyle conditions.  Includes: populations, employment, income etc.


**FI[4]     Fire**

Data related to wildland fires and the fire program.  Related data may be in FO or VG.  Includes: natural fires, prescribed fires etc.


**FO[4]     Forestry**

Data related to the forestry program.  Related data may be in the VG.  Includes forest stands,


**GF[1]     Geographic Features**

Data related to place and feature names primarily for general map annotation.


**HA[4]     Hazards**

Data related to the hazardous material program, not covered elsewhere. Includes: CCERCLA, RCRA sites, etc.


**HD[1]     Hydrography**

Data related to Hydrography, and parts of the Air/Soil/Water program.  Includes: lakes, rivers, streams, springs,  hydrologic units, water rights etc.


**LA[4]     Lands**

Data related to the lands program.  Includes: leases, permits, rights of way, etc.


**LE[4]     Law Enforcement**

Date related to the law enforcement program.  Includes: incidents, investigated sites, cooperative agreements, etc.


**MI[4]     Minerals**

Data related to mineral resources and the mineral program.  Includes, oil & gas wells, mineral leases, saleable minerals, mineral potentials etc.


**MP[4]     Management Plan**

Data relating Management Plan decisions, and boundaries associated with these plans.  Includes Resource Management Plans and decisions, Activity Management Plans, O&G categories, OHV categories etc.


**PH[3]     Physiography/Soils (LC, HP)**

Data related to the physical geography, landform, landscapes, land cover, soils, elevation, physiography, surface geology, geomorphology, and parts of the Air/Soil/Water program.  Includes NRCS STATSGO, SSURGO etc.

**RA[4]     Range**

Data related to the range program.  Includes: grazing allotments


**RE[4]     Recreation**

Data related to the recreation program.  Includes: ROS classes,


**RS[1]     Reference System**

Data related to geographic reference systems.  Includes various lat long tiles, utm lines and public land survey system, GCDB, etc.


**TR[1]     Transportation**

Data related to geographic features used to transport people.  Includes: Tramways, airports, airstrips, railroads, roads, trails, etc.


**UT[2]     Utilities**

Data related to features associated with the transport of things.  Includes: powerlines, phone lines, pipelines, sewer lines etc.


**VG[1]     Vegetation**

Data relating to plant and plant communities.  Includes server vegetation classification covers, riparian.


**VR[4]     Visual Resources**

Data related to the visual resource program.  Includes visual resource inventory and management classes, visual distance zones, scenic quality classes


**WL     Wildlife**

Data related to birds, mammals, invertebrates, reptiles, and amphibians, and aquatic species.  Includes: wildlife observations, habitat, threatened and endangered, herd units, etc.


**WH[4]     Wild Horse and Burros**

Data related to the Wild Horse and Burro program.  Includes: habitat, herd management area's etc.


**WI[4]     Wilderness**

Data related to the wilderness program.  Includes: wilderness study areas, inventory data,


[1]     Category matches AGRC
[2]     Category name matches AGRC and content sometimes matches AGRC
[3]     Category name doesn't match AGRC
[4]     New Category not covered by AGRC.

# Appendix E


# Version Description Document (VDD)


**(Forthcoming)**

# Appendix F


# GIS Implementation Schedule